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10/590,081	08/21/2006	Mitsuru Yamamoto	Q96217	4161

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EXAMINER	
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ART UNIT	**PAPER NUMBER**
2834	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,081	YAMAMOTO ET AL.	
	Examiner	Art Unit	
	Derek J. Rosenau	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4,5,11 and 12* is/are allowed.

6)☒ Claim(s) *1-3,6-10,13,14 and 18* is/are rejected.

7)☒ Claim(s) *15-17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 8, and 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not provide disclosure of a low-voltage power supply of 12VDC or less, but instead only provides descriptions of 5VDC and 12VDC low-voltage power supplies. In addition, the specification does not provide support for the claimed range of high voltages of approximately 140VDC to approximately 280VDC.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senda et al. (US 2002/0008439) in view of Honda et al. ("Class D Audio Amplifier Design"), Ishii et al. (US 2006/0132231), Nakano et al. (US 2002/0033322), and Katsumi et al. (JP 2001-355574).

5. With respect to claim 14, Senda et al. discloses a piezoelectric pump drive circuit comprising: an oscillation means (Fig 1, items 104 and 105) for generating a sine wave signal of the frequency that drives a piezoelectric element (Paragraph 41); an amplification means (item 106) for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave (Fig 1); a first control means for implementing variable frequency control at the time of activation of said sine wave oscillation means (Paragraphs 52-54); and a temperature sensing means for sensing temperature (item 112).

Senda et al. does not disclose expressly that the oscillation means is a sine wave oscillation means or a cooling system comprising: a voltage-boosting means for converting a low-voltage power supply to a high voltage; an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means for driving said piezoelectric element by a high-voltage sine wave; a second control means for adjusting the signal amplitude of said sine wave oscillation means in accordance with the sensed temperature of said temperature sensing means; wherein said amplification means is composed of: a D-class

amplifier driven by a high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width nodulation to realize amplification; a low pass filter for demodulating the output signal of said D-class amplifier; a heat sink that contacts a heat-generating body; a radiator for radiating heat to the outside; coolant circulation passages connected such that coolant circulates between said heat sink and said radiator; or a piezoelectric pump that is driven by said piezoelectric pump drive circuit for circulating coolant in said coolant circulating passages.

Honda et al. teaches an amplification means driven by a voltage supply for amplifying a signal supplied as output from a sine wave oscillation means and for driving an output by a high-voltage sine wave (page 5); wherein said amplification means is composed of: a D-class amplifier (pages 4-7) driven by a voltage generated from a voltage supply for subjecting the signal supplied as output from the sine wave oscillation means to pulse-width modulation to realize amplification (page 5); and a low-pass filter fro demodulating the output signal of said D-class amplifier (page 5).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the D-class amplifier of Honda et al. with the piezoelectric drive circuit of Senda et al. for the benefit of improved efficiency (page 2 of Honda et al.).

Ishii et al. teaches an amplification means including a D-class amplifier driven by a high voltage generated from a voltage-boosting means for converting

a low-voltage power supply to a high voltage (Paragraph 36) and that the oscillation means is a sine wave oscillation means (Paragraph 137).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the voltage-boosting means of Ishii et al. with the piezoelectric drive circuit of Senda et al. for the benefit of being able to use a lower-voltage power supply for the amplification means.

Nakano et al. teaches a piezoelectric drive circuit that includes a temperature sensing means for sensing temperature and a second control means for adjusting the signal amplitude of a sine wave oscillation means in accordance with the sensed temperature of said temperature sensing means (Paragraph 17).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the control means of Nakano et al. with the piezoelectric drive circuit of Senda et al. for the benefit of providing additional compensation due to fluctuations in temperature (Paragraph 17 of Nakano et al.).

Katsumi et al. teaches a cooling system (Abstract) comprising: a piezoelectric pump drive circuit (Abstract) comprising: a heat sink (Abstract, item 3) that contacts a heat-generating body (Abstract, item 4); a radiator for radiating heat to the outside Abstract, item 5); coolant circulation passages connected such that coolant circulates between said heat sink and said radiator (Abstract); and a piezoelectric pump that is driven by said piezoelectric pump drive circuit for circulating coolant in said coolant circulation passages (Abstract).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the cooling system of Katsumi et al. with the piezoelectric drive circuit of Senda et al. for the benefit of incorporating the temperature-compensated drive circuit of Senda et al. into the cooling system of Katsumi et al.

6. With respect to claim 13, the subject matter therein are rearrangements of the subject matter in claims 14; therefore, claim 13 is unpatentable over Senda et al. in view of Honda et al., Ishii et al., Nakano et al., and Katsumi et al. for the same reasons as above.

7. Claims 9 and10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senda et al. in view of Honda et al., Ishii et al., and Katsumi et al.

8. With respect to claims 9 and10, the subject matter therein are rearrangements of the subject matter in claims 14 with the exception that the control means implements variable frequency control over three or more different frequencies at the time of activation of said sine wave oscillation means. Senda et al. discloses that the control means implements variable frequency control over three or more different frequencies at the time of activation of said sine wave oscillation means (Fig 5). As the frequency can take on any value based on the detected speed, the control means would implement the variable frequency control over three or more different frequencies at the time of activation of said sine wave oscillation means (steps 501-511). Therefore, claims 9 and 10 are

unpatentable over Senda et al. in view of Honda et al., Ishii et al., and Katsumi et al. for the same reasons as above.

9. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senda et al. in view of Honda et al., Ishii et al., and Nakano et al.

10. With respect to claims 6 and 7, the subject matter therein are rearrangements of the subject matter in claims 14; therefore, claims 6 and 7 are unpatentable over Senda et al. in view of Honda et al., Ishii et al. and Nakano et al. for the same reasons as above.

11. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senda et al. in view of Honda et al. and Ishii et al.

12. With respect to claims 2 and 3, the subject matter therein are rearrangements of the subject matter in claims 14 and 9; therefore, claims 2 and 3 are unpatentable over Senda et al. in view of Honda et al. and Ishii et al. for the same reasons as above.

Allowable Subject Matter

13. Claims 4, 5, 11, and 12 are allowed.

14. The following is an examiner's statement of reasons for allowance: the prior art does not disclose or suggest "a control means for one of increasing the signal amplitude of said sine wave oscillation means when the temperature of the heat-generating body is increased and decreasing the signal amplitude of said sine wave oscillation means when the temperature of said heat-generating body

is decreased, based on the sensed temperature" in combination with the remaining claim elements of claims 4, 5, 11, or 12.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

15. Claims 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

16. The following is a statement of reasons for the indication of allowable subject matter: the prior art odes not disclose or suggest "a voltage detection circuit which detects when the voltage to the sine wave oscillation means is supplied at a power up and provides a signal to the control means indicative of a detection of voltage" in combination with the remaining claim elements of claim 15.

Response to Arguments

17. Applicant's arguments, see amendments/arguments, filed 10 November 2008, with respect to claims 1, 4, 5, 8, 11, and 12 have been fully considered and are persuasive. The 35 U.S.C. 103 rejections of claims 1, 4, 5, 8, 11, and 12 have been withdrawn.

18. Applicant's arguments filed 10 November 2008 have been fully considered but they are not persuasive.

19. Applicant argues that Senda does not teach or suggest adjusting the frequency when the sine wave oscillator is activated at power up, when the power is first applied to the circuit, as applicant alleges that the frequency adjustment takes place before activation. First, while the initial frequency control calculation may occur prior to activation of the motor, the frequency control is not actually implemented until start-up. Second, the frequency control illustrated in figure 5 continues in the loop defined by steps 508-511, which further includes additional frequency control steps.

20. Applicant argues that Senda does not teach or suggest providing variable frequency control over three or more different frequency when the sine wave oscillator is activated at the power up. However, both the targeted profile of step 505 and the loop defined by steps 508-511 would include variable frequency control over three or more frequencies, as the velocity of the motor is controlled by making adjustments to the frequency, and because the speed profile includes a continuous range of values, such as in figure 9, the variable frequency control would include three or more different frequencies.

21. Applicant argues that there is to teaching, suggestion, or motivation to combine Senda and Nakano, arguing that there would be no reason to combine the control units of Senda and Nakano as both disclose adjusting the frequency based on temperature. However, Nakano also discloses adjusting the amplitude based on temperature, and this is the feature for which it is cited. It would be obvious to combine the teachings of Senda and Nakano for providing a device that has both amplitude and frequency control.

22. Applicant argues that it is not understandable why one skilled in the art would combine the teachings of Senda and Nakano, and states that the reasoning for carrying out such a combination was not provided in the previous office action. However, the reasoning was provided as being for the benefit of providing additional compensation due to fluctuations in temperature. Applicant states that this reasoning is flawed as both already describe controlling the frequency based on sensed temperature. However, as stated previously, Nakano is cited for its teachings directed to controlling the amplitude based on temperature. Therefore, it would be obvious to combine the teachings of Senda and Nakano for the benefit of providing a device having both frequency and amplitude control.

23. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

24. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**.

See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is (571) 272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leung Quyen can be reached on (571) 272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quyen P Leung/
Supervisory Patent Examiner, Art Unit 2834

/D. J. R./
Examiner, Art Unit 2834